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Liquidity Risk and Asset Pricing in Pakistan Stock Exchange

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ABSTRACT

This paper empirically investigates the impact of liquidity risk on stock returns in Pakistan and determines investors' attitude under bull and bear market conditions. Specifically, the liquidity adjusted capital asset pricing model(CAPM) is modified by including the interaction between the liquidity risk and the indicators of bull- and bear-market periods to investigate whether the pricing of liquidity risk differs in both upward and downward market trends. The analysis is carried out for a large panel of Pakistani manufacturing firms listed at the Pakistan Stock Exchange for the period January 2000 – December 2015. We use alternative liquidity risk measures to check the robustness of the liquidity risk effect. We observe that higher liquidity risk yields higher excess stock returns, implying pricing of liquidity risk during the examined period. The results also reveal that the liquidity risk is positively and significantly related to excess returns in the high-liquidity-risk beta portfolios, whereas it is negatively or insignificantly related to excess returns of low-liquidity-risk beta portfolios. The results also provide evidence that stocks affected by liquidity risk yield positive expected returns in both bull and bear market conditions. However, we find significant differences in the pricing of liquidity risk under upward and downward market trends. The robustness check confirms that the findings on the pricing of liquidity risk are not driven by any specific measure of liquidity.

JEL Classification: *G11, G12, G15*

Keywords: *Asset Pricing Models; Bull and Bear Markets; Liquidity Risk; Risk Premium; Transaction Cost Theory*

INTRODUCTION

Financial markets are associated with numerous liquidity shocks that raise several fundamental questions regarding the stability of financial system. The equity market of any country represents the most important component of its financial system. It is influenced by various internal and external adverse shocks, financial and economic turmoil, and social and political events that produce periods of market instability. Unfavorable liquidity shocks generally cause market turbulence. These shocks generate prominent effects of liquidity risk for stock returns. The liquidity concept is described as the capability to sell or purchase large quantity of assets at any time at low transaction costs and without significantly affecting the market price (Pastor & Stambaugh, 2003). Similarly, liquidity risk represents the risk of being unable to sell securities without incurring a loss or large transaction costs (Liang & Wei, 2012; Nikolaou, 2009).

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Several studies have documented that institutional investors opt to invest in securities, taking into account the consideration of selling them again, the future trading cost, and the price variation at the time of selling. Such considerations are related to the liquidity of securities as it may affect potential future cash flow associated with the securities. Equity investors generally prefer to invest in stocks of firms that are more transparent, engaged in sustainable and quality reporting, and have more liquid assets (Bennett, Sias & Starks, 2003; Falkenstein, 1996). Unexpected, wide, and rapid fluctuations in stock prices cause a price spread on equity, which usually results in higher trading costs of stocks, generating the risk for which investors should have to be compensated by higher returns (Damodaran, 2005).[*]

The relationship between market liquidity and stock returns has become a growing area in the empirical literature of asset pricing. Numerous investigations including Amihud (2002), Amihud and Mendelson (1986), Barclay, Kandel and Marx (1998) and Haugen and Baker (1996) have examined the liquidity return relationship for different stock markets and documented important evidence indicating positive effects of liquidity risk on returns. However, several other papers have reported the negative liquidity-return relationship (Chordia, Roll & Subrahmanyam, 2001; Haugen & Baker, 1996). Similarly, some other studies found that liquidity co-moves with returns and it provides help in predicting future potential stock returns (Amihud, 2002; Bekaert, Harvey & Lundblad, 2007). Recently, using a large panel of non-financial firms, Karim and Rashid (2020) found that equity liquidity is positively, significantly related to firms' investment and financial performance. Hence, we may conclude that liquidity risk is a critical factor for investors and it should be properly priced in equity markets (Ajina, Lakhal & Sougné, 2015; Goyenko, Holden & Trzcinka, 2009; Liang & Wei, 2012; Pastor & Stambaugh, 2003).

Indeed, consistent with the theoretical underpinning, several empirical studies have examined whether there exists a considerable premium for liquidity risk. For instance, Glosten and Harris (1988), Hasbrouck (1991) and Brennan and Subrahmanyam (1996) investigated the linkage between illiquidity measures and stock returns. These studies' empirical findings suggest that securities exposed to high illiquidity risk are expected to yield higher required returns. Similarly, Chan and Faff (2005) analyzed the liquidity effect in the equity market by constructing liquidity portfolios and found substantial evidence for the pricing of liquidity. Nevertheless, the study of Chordia, Roll and Subrahmanyam (2001) documented that market liquidity changes over time and it is negatively serial correlated.

Although most of researchers have used asset pricing models to explain variations in cross-sectional stock returns, some scholars are of the view that the standard CAPM and the three-factor Fama-French (1993) model have some deficiencies in taking into account liquidity effects (Liu, 2006, 2010). Therefore, the studies of Acharya and Pedersen (2005), Lee (2011), and Liang and Wei (2012) estimated "the liquidity-adjusted capital asset pricing model" (LCAPM) and provided strong evidence that the liquidity risk is one of crucial concerns of equity investors when they adjust their portfolios, particularly at the time of market turbulence. Such evidence, of course, implies that liquidity risk is significantly priced in financial markets. Indeed, Chordia, Roll and Subrahmanyam (2000), Huberman and Halka (2001) and Liang and Wei (2012) showed that illiquid stocks generally yield higher expected returns. Similarly, by using various proxies for the transaction costs, Liu et al. (2016) documented that the liquidity factor is significant in predicting variations in cross-sectional stock returns. By applying "Pastor and Stambaugh's (2003) liquidity factor" Li, Novy-Marx and Velikov (2019) documented that expected stock returns are significantly affected by liquidity risk factor. Likewise, Hauser and Kedar–Levy (2018) showed that average risk aversion considerably changes with market liquidity, which increases the Sharpe ratio and hence, return volatility.

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[*] *Liquidity is considered one of fundamental factors affecting securities' price as it incorporates cost, volume, and time factors (Fernandez, 1999).*

Prior studies have examined the liquidity risk effects in the asset-pricing framework for several different markets across the globe. Nguyen and Lo (2013) for the New Zealand stock market and Miralles–Quirós (2017) for the Portuguese stock market documented that the liquidity risk is significantly priced and yields excess stock returns. Anderson (2017) indicated that bond liquidity and stock returns are positively related in the USA. Marozva (2019) estimating the liquidity-adjusted asset-pricing model showed that liquidity is an important factor in determining stock returns on Johannesburg Stock Exchange. Ma, Anderson and Marshall (2018) found that market liquidity significantly influences the volatility-return association and this effect is higher for countries having better governance. Dang and Nguyen (2020) provided evidence that liquidity shocks significantly affect expected stock returns in international equity markets and this effect is higher during financial crisis periods. Pereira, Camilo-da-Silva and Barbedo (2020) estimating the cross-sectional asset pricing regression for the Brazilian equity market showed that the liquidity factor is significantly related to stock returns. Huang and Ho (2020) using a large sample of Chinese listed firms showed that stock liquidity component of earning management is significant, positively related to expected stock returns. Ince (2020) found that the systematic component of Amihud's (2002) illiquidity measure has a positive, significant association with one-month-ahead expected stock return. Yet, the idiosyncratic component of illiquidity is not significantly priced in the market. The results of the study of Liu, Gregoriou and Bo (2020) indicated that the relationship between liquidity and stock returns is positive for Germany and the UK, the negative for China, whereas it is insignificant in the USA. Cakici and Zaremba (2021) studied whether the illiquidity premium exists in international equity markets and found that although it exists globally, the pricing of illiquidity risk mainly depends on firm size. Paul, Aryoubi and Walther (2021) examined the time-varying effect of stock illiquidity on expected returns in Germany and provided strong evidence of the liquidity risk pricing. However, for the Norwegian stock market, Leirvik, Fiskerstrand and Fjellvikås (2017) did not find any significant evidence of the liquidity effect on stock returns. Analogously, Musneh, Karim, Geetha and Arokiadasan (2020) estimating the liquidity-adjusted CAPM showed that the illiquidity factor is not priced in the Malaysian stock market.

There is another strand of the literature that indicates that the implications of risk differ during bull- and bear-market periods (Fabozzi & Francis, 1977). Some studies showed that investors' behavior and attitude towards risk significantly vary under different market conditions (Aslanidis, Osborn & Sensier, 2002; Crombez & Vennet, 1997; Peterson & Berglund, 2007; Yasir, Aamir & Ahmad, 2014). There is evidence on the volatility of Fama and French three-factor model during both upwards and downwards market conditions (Lawrence, Karels, Mishra & Prakash, 2006). Yet, the influence of systemic risk on stock return is significantly different in both up and down markets (Theriou, Aggelidis, Maditinos & Šević, 2010). However, we know little whether and how the liquidity factor influences stock returns under such conditions. Further, exploring whether liquidity risk is priced in the emerging equity market or not is worth exploring as these markets suffer more from the problem of illiquidity of stocks and its cost with respect to stock trading as well as firms' financing decisions. Therefore, this paper fills this vacuum left in the literature by investigating (i) whether and how liquidity risk influences stock returns in Pakistani equity market by using firm-level dataset for a sample of 405 publicly listed non-financial firms, (ii) whether the impact of liquidity risk on stock returns is asymmetric across stocks having different levels of liquidity risk, and (iii) whether the effect of liquidity risk on stock return differs in bull- and bear-market periods.

This paper contributes to the literature on several grounds. First, prior studies on the liquidity-return relationship have mainly focused on developed equity market. However, this study considers an emerging equity market – Pakistan Stock Exchange (PSX) – to explore whether liquidity risk is priced and whether investors' attitude towards liquidity risk is different in up and down markets.* Second, most existing studies have examined the role of liquidity factor in either the one-factor or the three-factor CAPM framework. Departing from these studies, this study considers the momentum factor proposed by Carhart (1997) along with the market factor and the two factors (value and size) proposed by Fama and French (1993) while examining the pricing of liquidity risk. Third, unlike most past studies, in this paper, the two-step procedure is adopted to examine liquidity risk premiums. As a first step, the historical liquidity risk betas are estimated by utilizing past three-year returns. In the second step, stocks are segregated into ten value-weighted portfolios based on the historical liquidity risk betas and then the liquidity adjusted five-factor CAPM is estimated to test liquidity risk premiums. Last but most importantly, the liquidity adjusted CAPM is modified by including the interaction between the liquidity risk and the indicators of bull- and bear-market periods to investigate whether the pricing of liquidity risk differs in both upward and downward market trends. One should also note that this paper uses the liquidity measure proposed by Pastor and Stambaugh (2003), which is considered better than other existing measures. Yet, an alternative measure of stock liquidity is also used to ensure the robustness of the results.

The paper is arranged as follows. Introduction, motivations, objectives, and contributions are given in Section 1. Empirical models, methodology, and data are discussed in Section 2. The results are presented in Section 3. Some conclusions are offered in final section.

EMPIRICAL FRAMEWORK

Quantifying liquidity risk

PS-liquidity measure

The liquidity measure proposed by Pastor and Stambaugh (2003) is based on the price fluctuations caused by order flow. It is constructed using the (positive and negative) signed trading volume. It is negative (positive) if returns of a stock are less (greater) than market returns. This means that lower (higher) future returns are projected when there is low (high) liquidity in the market. To implement this measure, as a first step, the following month-wise OLS regression is estimated for each stock having at least 15 observations.

$$r^{e}_{i,d+1,t} = \alpha_{i,t} + \beta_{i,t} r^{e}_{i,d,t} + \gamma_{i,t} sign(r^{e}_{i,d,t}) \times v_{i,d,t} + \varepsilon_{i,d+1,t} \quad (1)$$

Market liquidity has become an important issue in Pakistan since the nuclear test in May 1998 (Ali & Afzal, 2012). Further, it also significantly, adversely affected by the 2007-08 financial crisis (Qayyum & Khan, 2014). The outflow of foreign investments, weak economic performance, and political unrest in the country also adversely influenced stocks' liquidity (Najaf, Najaf & Yousaf, 2016). Therefore, Pakistan' equity market seems an interesting case for investigating the role of liquidity in asset pricing.

where indexes i,d, and t represent stock, day, and month, respectively. $r_{i,d,t}$ is stock return and $r^e_{i,d,t} = r_{i,d,t} - r_{m,d,t}$, where index m represents market. sign($r^e_{i,d,t}$) represents the sign of excess market returns, whose value is '+1' if ($r^e_{i,d,t}$)>0, '-1' if ($r^e_{i,d,t}$)<0, and '0' if ($r^e_{i,d,t}$)=0. $v_{i,d,t}$ denotes trading volume. $\gamma_{i,t}$ represents liquidity measure.

Next, the market wide, monthly liquidity innovations are calculated as follows.

$$\Delta\hat{\gamma}_t = (m_t / m_1) \times 1/N_t \sum_i^{N_t} (\hat{\gamma}_{i,t} - \hat{\gamma}_{i,t-1}) \quad (2)$$

where m_t and m_1 denote market value of all stocks in current and first months, respectively and N_t = total number of stocks in current month. As a next step, equation (3) is estimated to get the serially independent residuals.

$$\Delta\hat{\gamma}_t = a + b\Delta\hat{\gamma}_{t-1} + c(m_t / m_1) \times \hat{\gamma}_{t-1} + \theta_t \quad (3)$$

Finally, the liquidity risk, L_t, is defined as the estimated residual, $\hat{\theta}_t$, scaled by 100.*

$$L_t = \frac{\hat{\theta}_t}{100} \quad (4)$$

METHODOLOGY

Estimating past liquidity risk beta

After having quantified liquidity risk, the historical liquidity risk beta is estimated for each stock by running OLS regression in the following framework.

$$R_{i,\tau} \quad \alpha_i \quad \beta^l_{i,t\ \ 1} L_\tau + \beta^m_{i,t-1} MKTX_\tau + \beta^h_{i,t-1} HML_\tau + \beta^s_{i,t-1} SMB_\tau + \beta^w_{i,t-1} WML_\tau \quad \varepsilon_{i,\tau}$$

$$\tau = t - 36, \ldots, t - 1 \quad (5)$$

where $R_{i,\tau}$ = monthly excess returns, L_τ = the liquidity risk in month τ, and $MKTX_\tau$, HML_τ, SMB_τ, and WML_τ are the market, value, size, and momentum factors, respectively.

After having obtained the past liquidity risk betas, ten value-weighted portfolios are built based on these betas to test liquidity risk premiums. The first portfolio includes the stocks having lowest past liquidity risk beta, whereas the tenth portfolio has the stocks that have highest past liquidity risk beta. These portfolios are rebuilt in each month based on the updated past liquidity-risk betas. This framework is followed to examine whether liquidity risk premium varies with the level of liquidity risk.

Estimating liquidity risk premium

Following Liang and Wei (2012), the following regression is estimated for each portfolio constructed based on past liquidity risk betas.

$$R_{j,t} = \alpha_j + \beta^l_j L_t + \beta^m_j MKTX_t + \beta^h_j HML_t + \beta^s_j SMB_t + \beta^w_j WML_t + \varepsilon_{j,t} \quad (6)$$

where $R_{j,t}$ = excess returns on the past liquidity risk beta-sorted portfolio j, where j = 1,2,3,…,10. The rest of the factors are the same as in equation (5).

The scaling by 100 is arbitrary and it just provides more convenient liquidity beta's magnitude.

To examine whether the pricing of liquidity risk differs in up and down markets, the indicator (dummy variable) of market condition is generated and interacted with the liquidity risk. Specifically, the model takes the following form.

$$R_{j,t} = \alpha_j + \beta_j^{l\_bull} L_t . D_t^{bull} + \beta_j^{l\_bear} L_t . D_t^{bear} + \beta_j^{m} MKTX_t + \beta_j^{h} HML_t + \beta_j^{s} SMB_t + \beta_j^{w} WML_t + \varepsilon_{j,t} \quad (7)$$

where $\mathrm{D}_{\mathrm{t}}^{\mathrm{bull}} (\mathrm{D}_{\mathrm{i,t}}^{\mathrm{bear}})$ 1 if the market shows upward (downward) trend and it is otherwise zero.

Data and sample

To carry out an empirical investigation, a panel dataset of 405 non-financial firms listed at the Pakistan Stock Exchange (PSX) during the periods January 2000-December 2015 is utilized. The selected companies represent all the important sectors of the economy. The required data are collected from the “Balance Sheet Analysis of Non-Financial Firms” published by the “State Bank of Pakistan” (SBP). Financial firms are excluded from the analysis due to different financial structures. Share prices are obtained from the official website of the PSX.

Portfolio construction

This study follows Gregory (2013) for portfolio construction in Fama and French (1993), fashion and Carhart (1997), momentum factor. In particular, first, all stocks are sorted into two groups: “S” for “(small) size group” and “B” for “(big) size group”, by using the median market capitalization as the size breakpoint. The size factor is defined as a value-weighted return on the small-minus-big portfolio. Next, the stocks are sorted based on the book-to-market ratio into three groups, namely, “H” for (high), “M” for (medium), and “L” for (low), using 30th and 70th percentiles as the book-to-market breakpoints. The value factor represents the “value-weighted return” on the “high-minus-low portfolio”. The study uses stock returns to compile two momentum groups: “L” for (losers) and “W” for (winners), by using 30th and 70th percentiles of stock performance (cumulative returns) over months t-12 to t-2. The momentum factor refers to the “value-weighted return” on the “winners-minus-losers portfolio”.

After having estimated the historical liquidity risk betas by running the regression using three years of monthly data in December of each year, the stocks are clustered into ten groups to build value-weighted portfolios. Excess returns of these past liquidity risk beta-based portfolios are calculated relative to market returns. Specifically, ten quintiles of the estimated past betas are formed and monthly excess returns are computed for each constructed portfolio. [*]

RESULTS

Table 1 presents the summary statistics of variables used in the analysis. The mean value of returns portfolio (R_t) is greater than the median value. This implies that the observations of the stock excess return portfolio are positively skewed. From the mean and median values of the PS’s LR factor (L_t), we observe that our liquidity risk factor is negatively skewed. This implies that Pakistani firms’ stocks are likely to move up or down, depending on the given rupee trading volume per stock.

We observe from mean and median values of the liquidity risk factor under up and down market trends that the liquidity risk is negatively skewed in both conditions. Further, the market factor (MKTX_t) is positively skewed, as the mean is greater than the median. However, both HML_t and SMB_t are negatively skewed and the negative sign suggests that big firms' stocks can earn more than small ones. Moreover, the mean value of the momentum factor (WML_t) is greater than the median, which implies that the momentum factor is positively skewed.

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[*] *On average, a single portfolio covers 40 firms and no portfolio covers less than 39 firms.*

Table 1:
Summary Statistics

Variables	Statistics				
	Abbreviation	Obs.	Mean	Median	Std. Dev.
Returns portfolio	R_t	1489	-0.010	-0.067	1.106
PS liquidity risk factor	L_t	1489	-0.318	2.667	31.53
Liquidity risk factor in bull market	$L_t . D_{i,t}^{bull}$	1489	-0.717	0.000	23.30
Liquidity risk factor in bear market	$L_t . D_{i,t}^{bear}$	1489	0.581	2.667	19.25
Market factor	$MKTX_t$	1489	-0.069	-0.073	0.079
Value factor	HML_t	1489	-0.162	-0.039	0.745
Size factor	SMB_t	1489	-0.011	-0.004	0.311
Momentum factor	WML_t	1489	0.657	0.513	0.679

Liquidity risk premium

The estimates of the pooled OLS regressions are displayed in Table 2 and Table 3 to determine whether the liquidity risk is priced in the market. Inspecting the estimated coefficient of liquidity risk in Panel A of Table 2, it is observed that the premium increases with liquidity risk. Said differently, the higher the level of the liquidity risk, the higher the amount of premium. The estimated coefficient value of low liquidity risk beta-based portfolio (L) is significantly negative, whereas, of high liquidity beta portfolio (H) is significantly positive, indicating that stocks with higher liquidity-risk betas offer higher expected returns. This implies that the liquidity risk is significantly priced in the market.

Consisting with the sorting procedure, the (H – L) liquidity risk beta spread, which represents the difference of liquidity risk premium between high-decile and low-decile portfolios, is positive and significant. This positive sign provides evidence for liquidity risk pricing in Pakistan's equity market. This finding suggests that increased liquidity risk results in positive excess stock returns. This excess return implies that there is a significant liquidity risk premium for less liquid stocks trading in the market. The significant positive sign of liquidity risk beta coefficient is consistent with our prediction and first objective of the study. Further, the evidence of the positive liquidity risk premium is in line with the findings of the studies (Pastor & Stambaugh, 2003; Lee, 2011; Liang & Wei, 2012)

In addition, we observe that the value of (H – L) liquidity risk alpha spread, which represents an abnormal return, is statistically insignificance. This leads us to accept our hypothesis and infer that the liquidity risk is significantly priced and the liquidity risk factor is a vital factor in predicting excess portfolio returns. This finding confirms for excess stock returns because of liquidity risk, suggesting that the liquidity risk is a significant pricing factor in the PSX. Stocks having higher liquidity risk yield extra returns to compensate the investors that bear higher liquidity risk. Therefore, equity investors are expected to demand "liquidity risk premium" for investing in stocks that have higher sensitivity to the liquidity risk. This finding also suggests that corporate firms with relatively illiquid stocks should offer premium to attract investors.

Demanding a higher liquidity risk premium is even more important for short horizon investors. On the other hand, stocks that are considered liquid usually do not offer higher excess returns due to the reason that such stocks can be traded instantly in large quantities and without substantially incurring a loss and trading costs. Finally, these findings suggest that investors need compensations for illiquid stocks, and this even becomes more important when stocks' liquidity declines, specifically in periods of liquidity crisis. The evidence of the presence of significant liquidity risk premium in Pakistani equity market also provides useful insights to firm managers as the liquidity risk premium demanded by investors significantly impacts costs of issuing equity to raise equity capital.

In Pakistan, the instability in the equity market, the outflow of foreign investments, the overall poor economic performance of the country, and the influence of global financial factors cause significant drops in the market liquidity (Ali & Afzal, 2012; Qayyum & Khan, 2014). Such declines affect less liquid (illiquid) stocks more than liquid ones in the equity market. Thus, requiring a liquidity risk premium for holding these stocks provides a composition to the equity traders for taking liquidity risk. Together, the results reported here suggest that the liquidity risk measure of Pastor & Stambaugh (2003) represents a systematic pricing factor in the PSX. This implies that equity investors should consider the liquidity factor while making investment decisions.

Liquidity risk premium: Bull and bear markets

Table 3 presents the liquidity risk betas along with four risk factors' betas for the portfolios ranked from "low-beta" portfolio (L) to "high-beta" portfolio (H) under bull and bear markets Inspecting the influence of the liquidity risk on stock returns in periods of bull market it is observed that the estimated premium is negative, significant for low-liquidity-beta portfolio, whereas, it is positive, significant for high-liquidity-beta portfolio. These findings indicate that liquidity risk factor is significantly priced in bull-market periods. Further, the estimates show that this liquidity risk premium spread under bull market is statistically significant. This indicates that investors investing in stocks are expected to demand risk premiums, in terms of excess returns, for stocks that are considered less liquid (illiquid) during bull market conditions. These findings also suggest that in periods of bull market, holding stocks that are highly exposed to liquidity risk leads investors to demand excess returns in terms of premium for liquidity risk.

It is also observed that the estimated value of liquidity risk beta for both low-beta (L) and high-beta (H) portfolios under bear market condition is negative but appears statistically insignificant. This finding implies that in periods of bear market, the liquidity risk is not priced in Pakistan's equity market. Yet, the results indicate that the premium is positive and significant for portfolios 2 to 5. The results further indicate that the (H – L) liquidity risk beta spread under bear market conditions is also insignificantly positive. Furthermore, it is evident that the value of (H – L) liquidity risk alpha spread, which represents an abnormal return, is statistically insignificant. This provides strong evidence that the liquidity risk affects stock returns quite differently during upward and downward market conditions. This finding has several applications for both investors and firm managers. On the one hand, it suggests that investors considerably demand premiums in bull markets for taking liquidity risk. On the other hand, it suggests that how firm managers can attract equity investors and effectively raise equity capital by issuing new equities.

The results in Table 3 confirm that investors require an excess amount of returns because of liquidity risk associated with stocks, suggesting that the liquidity risk represents a significant pricing factor in Pakistan. Due to the different price fluctuations during periods of bull and bear markets, investors' attitude towards liquidity risk significantly differs. In Pakistan, investors are generally risk-averse and they try to avoid any financial loss in their investment (Najaf, Najaf, & Yousaf, 2016). Our results show that although the liquidity risk is considerably priced in both market conditions, the liquidity risk premium is more prominent in periods of bear market. The pricing of liquidity risk under bear market conditions appears to be insignificant. This insignificant behavior does not necessarily imply that the liquidity risk is not a pricing factor during market downturns (bear). Yasir, Aamir and Ahmad (2014) have also documented a similar attitude of investors towards risk in Pakistan.

Robustness tests

To check the robustness of our results, we re-estimate liquidity risk premia by using alternative liquidity risk measure Amihud (2002) illiquidity measure. Consistent with our earlier findings, Table 4 shows that the liquidity risk is positively related to equity returns. The (H – L) liquidity risk beta spread is significantly positive, providing evidence for liquidity risk pricing in Pakistan's equity market. We also find that the value of (H – L) liquidity risk alpha spread is statistically insignificant, which confirms that the liquidity factor significantly predicts equity returns. This suggests that the liquidity risk is considered a pricing factor in the PSX. In sum, we can say that these results are similar to our earlier reported findings.

The results presented in Table 5 also support our earlier claims that the liquidity risk affects stock returns differently under bull and bear markets. According to the reported results, the (H – L) liquidity beta spread under bull market conditions is significantly positive, suggesting that stocks yield higher liquidity risk premium during bull-market periods. Similar to our earlier findings, the (H – L) liquidity risk betas spread under bear market condition is also positive but statistically insignificant. Taken together, the evidence of the positive liquidity risk premiums presented in this paper is robust to different measures of liquidity risk.

Table 2:

Liquidity Risk Premium for Value-Weighted Portfolios

	Decile Portfolios										
	L	2	3	4	5	6	7	8	9	H	H-L
Panel A: Liquidity betas											
Liquidity risk (L)	-0.011	-0.007	-0.005	-0.005	-0.002	-0.002	-0.000	0.001	0.003	0.009	0.020
$t-statistic$	(-3.02)	(-2.31)	(-1.93)	(-1.89)	(-0.80)	(-0.92)	(-0.22)	(0.35)	(1.22)	(3.59)	(8.75)
Panel B: Additional betas											
MKTX	0.469	-0.062	0.054	0.119	0.119	0.418	0.531	0.379	0.514	0.628	0.159
$t-statistic$	(0.36)	(-0.06)	(0.06)	(0.12)	(0.15)	(0.52)	(1.06)	(0.59)	(0.68)	(0.66)	(0.06)
HML	-0.734	0.025	0.048	-0.051	-0.148	-0.258	-0.539	-0.506	-0.661	-0.952	-0.218
$t-statistic$	(-5.22)	(0.21)	(0.46)	(-0.46)	(-1.70)	(-2.98)	(-10.01)	(-7.32)	(-8.20)	(-9.27)	(0.18)
SMB	-2.138	-2.449	-2.213	-2.275	-1.770	-1.965	-1.294	-1.368	-1.228	-0.348	1.790
$t-statistic$	(-6.31)	(-8.80)	(-8.84)	(-8.50)	(-8.48)	(-9.42)	(-9.98)	(-8.22)	(-6.33)	(-1.41)	(1.81)
WML	0.035	-0.145	-0.159	-0.146	-0.114	-0.199	-0.108	-0.159	-0.094	0.166	0.131
$t-statistic$	(0.21)	(-1.02)	(-1.24)	(-1.07)	(-1.06)	(-1.87)	(-1.63)	(-1.88)	(-0.95)	(1.32)	(0.11)
Panel C: Alphas											
Alpha	-0.0273	0.003	0.046	0.012	-0.008	0.051	0.009	0.026	-0.015	-0.159	-0.132
$t-statistic$	(-0.16)	(0.02)	(0.34)	(0.09)	(-0.07)	(0.45)	(0.13)	(0.29)	(-0.15)	(-1.18)	(0.23)
Panel D: Diagnostic tests											
$F-$test	17.01	17.56	17.73	16.61	17.56	24.26	49.97	31.67	27.91	24.50	
$p-$value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
R – square	0.369	0.387	0.389	0.374	0.388	0.466	0.643	0.533	0.501	0.469	
Adj. R – square	0.348	0.365	0.367	0.352	0.367	0.466	0.629	0.516	0.483	0.449	

Note: The table reports the estimated values of the coefficient of liquidity risk and four other risk factors: market, value, size and momentum. The excess returns of ten portfolios constructed based on the liquidity-risk betas are value-weighted. Using three years of monthly stock returns between January 2000 and December 2015, historical liquidity risk betas are estimated as $R_{i,\tau} = \alpha_i + \beta^l_{i,t-1} L_\tau + \beta^m_{i,t-1} MKTX_\tau + \beta^h_{i,t-1} HML_\tau + \beta^s_{i,t-1} SMB_\tau + \beta^w_{i,t-1} WML_\tau + \varepsilon_{i,\tau}$, where $\tau = t-36, \dots, t-1$. Panel A reports liquidity risk premiums estimated by estimating the pooled OLS regression: $R_{j,t} = \alpha_j + \beta^l_j L_t + \beta^m_j MKTX_t + \beta^h_j HML_t + \beta^s_j SMB_t + \beta^w_j WML_t + \varepsilon_{j,t}$. Panel B reports the additional risk factors' betas. Panel C reports estimated Alphas. Diagnostic tests are reported in Panel D. The t-statistics are in parentheses.

Table 3:
Liquidity Risk Premium Under Bull and Bear Market Conditions

	Decile portfolios										
	L	2	3	4	5	6	7	8	9	H	H-L
					Liquidity betas						
Liquidity risk (L): Bull market	-0.011	-0.011	-0.009	-0.006	-0.005	-0.003	0.051	0.094	0.118	0.188	0.199
t – statistic	(-2.99)	(-3.90)	(-3.96)	(-2.42)	(-2.34)	(-1.19)	(5.51)	(8.97)	(10.08)	(15.29)	(17.03)
Liquidity risk (L): Bear market	-0.043	0.114	0.117	0.278	0.089	0.004	-0.002	-0.003	-0.002	0.003	0.046
t – statistic	(-0.68)	(5.73)	(6.76)	(6.14)	(5.93)	(0.67)	(-1.65)	(-1.95)	(-1.15)	(1.58)	(0.13)
					Panel B: Additional betas						
MKTX	0.326	0.440	0.706	1.303	0.574	0.449	0.368	0.158	0.195	0.177	-0.149
t – statistic	(0.24)	(0.46)	(0.84)	(1.39)	(0.79)	(0.56)	(0.81)	(0.31)	(0.34)	(0.29)	(0.03)
HML	-0.702	0.071	0.088	-0.330	-0.117	-0.257	-0.280	-0.038	-0.089	-0.064	0.638
t – statistic	(-4.54)	(0.70)	(0.99)	(3.06)	(-1.51)	(-2.97)	(-4.18)	(-0.50)	(-1.06)	(-0.73)	(2.12)
SMB	-2.184	-2.904	-2.656	-1.939	-2.101	-1.980	-1.409	-1.579	-1.484	-0.761	1.423
t – statistic	(-6.21)	(-11.23)	(-11.88)	(-7.99)	(-10.86)	(-9.48)	(-11.83)	(-11.73)	(-9.84)	(-4.82)	(1.56)
WML	0.013	-0.223	-0.288	0.067	-0.193	-0.192	-0.180	-0.306	-0.283	-0.121	-0.134
t – statistic	(0.08)	(-1.76)	(-2.59)	(0.54)	(-2.01)	(-1.80)	(-2.94)	(-4.40)	(-3.62)	(-1.48)	(0.19)
					Panel C: Alphas						
Alpha	0.037	-0.183	-0.093	-0.624	-0.131	0.039	0.025	0.062	0.020	-0.089	-0.126
t – statistic	(0.17)	(-1.33)	(-0.79)	(-3.81)	(-1.26)	(0.35)	(0.40)	(0.86)	(0.25)	(-1.06)	(0.16)
					Panel D: Diagnostic tests						
F – test	14.15	24.79	28.56	24.22	24.69	20.42	55.97	55.07	56.18	87.47	
p – value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
R – square	0.371	0.519	0.554	0.513	0.519	0.470	0.709	0.705	0.709	0.792	
Adj. R – square	0.345	0.498	0.535	0.492	0.499	0.447	0.696	0.693	0.696	0.783	

Note: The table reports the estimated values of the coefficient of liquidity risk factor and four other risk factors: market, value, size and momentum. The excess returns of ten portfolios constructed based on the liquidity-risk betas are value-weighted. Using three years of monthly stock returns between January 2000 and December 2015, historical liquidity risk betas are estimated as $R_{i,\tau} = \alpha_i + \beta^{l}_{i,t-1} L_\tau + \beta^{m}_{i,t-1} MKTX_\tau + \beta^{h}_{i,t-1} HML_\tau + \beta^{s}_{i,t-1} SMB_\tau + \beta^{w}_{i,t-1} WML_\tau + \varepsilon_{i,\tau}$, where $\tau = t-36, \ldots, t-1$. Panel A reports liquidity-risk premiums estimated by estimating the pooled OLS regression: $R_{j,t} = \alpha_j + \beta_j^{l\text{-}bull} L_t . D_t^{bull} + \beta_j^{l\text{-}bear} L_t . D_t^{bear} + \beta_j^{m} MKTX_t + \beta_j^{h} HML_t + \beta_j^{s} SMB_t + \beta_j^{w} WML_t + \varepsilon_{j,t}$. Panel B reports the additional risk factors' betas. Panel C reports estimated Alphas. Diagnostic tests are reported in Panel D. The t-statistics are in parentheses.

CONCLUSION

This paper empirically investigates whether and how liquidity risk influences stock returns in Pakistani equity market by using a firm-level dataset for a sample of 405 publicly listed non-financial firms. It also examines whether the effect of liquidity risk on stock return differs in bull- and bear-market periods. We use the liquidity measure of Pastor & Stambaugh (2003) to quantify stock liquidity risk. To test whether liquidity risk premium exists, first, ten value-weighted portfolios are constructed by sorting the stocks included in the sample based on the historical calculated liquidity risk betas and then the excess returns of these portfolios are regressed on the liquidity risk factor and four other factors, namely market, size, value, and momentum.

The results provide strong evidence of pricing of liquidity risk during the examined period. Specifically, the estimation results suggest that the liquidity risk is positively and significantly related to excess returns in the high-liquidity-risk beta portfolios, whereas, it is negatively or insignificantly related to excess returns of low-liquidity-risk beta portfolios. The spread between the risk premium on low- and high-beta portfolios is positive and statistically significant, suggesting that the liquidity risk is significantly priced in Pakistan's equity market. Similar results are found for bull market. Nevertheless, the results do not provide any significant evidence of the pricing of liquidity risk in bear market periods. The robustness check confirms that the findings on the pricing of liquidity risk are not driven by any specific measure of liquidity.

The findings of the paper have several important policy implications. Since liquidity risk is significantly priced, a proper measurement of liquidity risk is vital to determine the required rate of returns while making investment decisions and measuring cost of equity capital. The results also suggest that investors should take into consideration liquidity risk while investing in illiquid stocks. Likewise, new equity issuers should offer liquidity risk adjusted returns to attractive investors. The results of the paper also suggest that investors exhibit quite different behaviors and attitude towards liquidity risk during upward and downward market trends. The evidence on the pricing of liquidity risk suggests that policymakers should take appropriate measures to mitigate the likelihood of liquidity crisis because stocks are sensitive to liquidity risk. For further research on this area, it would be worthwhile to examine the channels through which liquidity risk affects stock returns. It would also be useful to examine firm-specific and macroeconomic determinants of liquidity risk. Finally, it would be also significant to examine whether the influence of liquidity risk on excess stock returns changes over time, whether it is long lasting or die out over few months and whether it becomes strengthen or weak in periods of economic and financial crisis.

Table 4:
Liquidity Risk Premium for Value-Weighted Portfolios: An Alternative Measure

	Decile portfolios									
	L	2	3	4	5	6	7	8	9	H	H-L
					Panel A: Liquidity betas						
Liquidity risk (L)	-0.839	-0.668	-0.687	-0.529	-0.376	-0.207	-0.124	-0.163	-0.211	-0.095	0.744
t – statistic	(-5.39)	(-4.89)	(-5.71)	(-5.13)	(-3.85)	(-2.42)	(-1.24)	(-1.96)	(-2.15)	(-1.32)	(4.44)
					Panel B: Additional betas						
MKTX	0.348	0.285	0.309	0.154	0.195	0.120	0.321	0.189	0.286	0.659	0.311
t – statistic	(0.33)	(0.30)	(0.37)	(0.22)	(0.29)	(0.21)	(0.47)	(0.33)	(0.42)	(1.33)	(0.31)
HML	-0.149	-0.134	0.113	-0.028	-0.066	-0.116	-0.474	-0.331	-0.659	-0.997	-0.848
t – statistic	(-1.15)	(-1.18)	(1.12)	(-0.33)	(-0.81)	(-1.63)	(-5.67)	(-4.78)	(-8.08)	(-16.59)	(2.34)
SMB	-2.734	-2.782	-1.904	-2.056	-1.781	-1.587	-2.741	-1.632	-1.707	-1.512	1.222
t – statistic	(-9.87)	(-11.47)	(-8.92)	(-11.20)	(-10.27)	(-10.46)	(-15.37)	(-11.03)	(-9.79)	(-11.78)	(1.37)
WML	-0.093	-0.038	-0.064	0.005	0.023	0.045	0.024	0.121	0.156	0.215	0.308
t – statistic	(-0.74)	(-0.33)	(-0.64)	(0.06)	(0.28)	(0.63)	(0.29)	(1.73)	(1.90)	(3.54)	(1.59)
					Panel C: Alphas						
Alpha	0.013	-0.048	-0.001	-0.056	-0.071	-0.085	-0.072	-0.125	-0.168	-0.184	-0.197
t – statistics	(0.09)	(-0.38)	(-0.01)	(-0.58)	(-0.78)	(-1.07)	(-0.77)	(-1.61)	(-1.84)	(-2.74)	(1.38)
					Panel D: Diagnostic tests						
F – test	33.51	39.17	25.93	36.05	28.82	28.03	67.81	39.02	49.50	126.35	
p – value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
R – square	0.536	0.585	0.483	0.568	0.511	0.502	0.709	0.584	0.640	0.819	
Adj. R – square	0.520	0.569	0.464	0.552	0.493	0.484	0.699	0.569	0.627	0.813	

Note: The table reports the estimated values of the coefficient of liquidity risk and four other risk factors: market, value, size and momentum. The excess returns of ten portfolios constructed based on the liquidity-risk betas are value-weighted. Using three years of monthly stock returns between January 2000 and December 2015, historical liquidity-risk betas are estimated as $R_{i,\tau} = \alpha_i + \beta^{l}_{i,t-1} L_\tau + \beta^{m}_{i,t-1} MKTX_\tau + \beta^{h}_{i,t-1} HML_\tau + \beta^{s}_{i,t-1} SMB_\tau + \beta^{w}_{i,t-1} WML_\tau + \varepsilon_{i,\tau}$, where $\tau = t-36, \dots, t-1$. Panel A reports liquidity risk premiums estimated by estimating the pooled OLS regression: $R_{j,t} = \alpha_j + \beta^{l}_{j} L_t + \beta^{m}_{j} MKTX_t + \beta^{h}_{j} HML_t + \beta^{s}_{j} SMB_t + \beta^{w}_{j} WML_t + \varepsilon_{j,t}$. Panel B reports the additional risk factors' betas. Panel C reports estimated Alphas. Diagnostic tests are reported in Panel D. The t-statistics are in parentheses.

Table 5:

Liquidity-risk premium under bull and bear market conditions: An alternative measure

	Decile portfolios										
	L	2	3	4	5	6	7	8	9	H	H-L
					Panel A: Liquidity betas						
Liquidity-risk (L): Bull market	-1.114	-0.892	-1.033	-0.789	-0.537	-0.295	-0.167	-0.207	-0.267	-0.184	0.930
t – statistic	(-6.16)	(-5.62)	(-7.30)	(-6.36)	(-4.46)	(-2.76)	(-1.33)	(-1.98)	(-2.17)	(-1.28)	(3.26)
Liquidity-risk (L): Bear market	-0.193	-0.134	-0.072	-0.081	-0.097	-0.057	-0.048	-0.088	-0.113	-0.067	0.126
t – statistic	(-0.70)	(-0.55)	(-0.38)	(-0.50)	(-0.62)	(-0.41)	(-0.29)	(-0.64)	(-0.71)	(-0.82)	(0.54)
					Panel B: Additional betas						
MKTX	0.288	0.212	0.251	0.151	0.197	0.108	0.314	0.183	0.271	0.661	0.373
t – statistics	(0.28)	(0.23)	(0.32)	(0.22)	(0.30)	(0.18)	(0.45)	(0.32)	(0.40)	(1.33)	(0.48)
HML	-0.044	-0.051	0.243	0.074	-0.004	-0.081	-0.457	-0.313	-0.637	-0.966	-0.922
t – statistic	(-0.33)	(-0.44)	(2.43)	(0.84)	(-0.05)	(-1.08)	(-5.15)	(-4.25)	(-7.33)	(-12.96)	(2.48)
SMB	-2.764	-2.799	-1.927	-2.076	-1.790	-1.594	-2.745	-1.635	-1.710	-1.494	1.270
t – statistic	(-10.21)	(-11.78)	(-9.53)	(-11.76)	(-10.47)	(-10.53)	(-15.35)	(-11.02)	(-9.79)	(-11.42)	(1.46)
WML	-0.094	-0.044	-0.089	-0.001	0.019	0.043	0.023	0.120	0.156	0.218	0.312
t – statistic	(-0.76)	(-0.40)	(-0.94)	(-0.01)	(0.24)	(0.60)	(0.27)	(1.72)	(1.89)	(3.58)	(1.65)
					Panel C: Alphas						
Alpha	-0.009	-0.067	0.001	-0.056	-0.072	-0.086	-0.070	-0.125	-0.169	-0.180	-0.171
t – statistics	(-0.07)	(-0.54)	(0.01)	(-0.61)	(-0.80)	(-1.09)	(-0.75)	(-1.61)	(-1.85)	(-2.67)	(1.11)
					Panel D: Diagnostic tests						
F – test	30.57	35.18	26.95	34.53	25.55	23.82	56.29	32.48	41.22	105.00	
p – value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
R – square	0.560	0.605	0.539	0.604	0.528	0.508	0.709	0.585	0.642	0.820	
Adj. R – square	0.542	0.588	0.519	0.586	0.507	0.487	0.697	0.567	0.626	0.813	

Note: The table reports the estimated values of the coefficient of liquidity risk and four other risk factors: market, value, size and momentum. The excess returns of ten portfolios constructed based on the liquidity-risk betas are value-weighted. Using three years of monthly stock returns between January 2000 and December 2015, historical liquidity risk betas are estimated as $R_{i,\tau} = \alpha_i + \beta_{i,t-1}^{l} L_\tau + \beta_{i,t-1}^{m} MKTX_\tau + \beta_{i,t-1}^{h} HML_\tau + \beta_{i,t-1}^{s} SMB_\tau + \beta_{i,t-1}^{w} WML_\tau + \varepsilon_{i,\tau}$, where $\tau = t-36, \ldots, t-1$. Panel A reports liquidity risk premiums estimated by estimating the pooled OLS regression: $R_{j,t} = \alpha_j + \beta_j^{l\_bull} L_t.D_t^{bull} + \beta_j^{l\_bear} L_t.D_t^{bear} + \beta_j^{m} MKTX_t + \beta_j^{h} HML_t + \beta_j^{s} SMB_t + \beta_j^{w} WML_t + \varepsilon_{j,t}$. Panel B reports the additional risk factors' betas. Panel C reports estimated Alphas. Diagnostic tests are reported in Panel D. The t-statistics are in parentheses.

REFERENCES

Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics, 77 (2)*, 375-410. https://doi.org/10.1016/j.jfineco.2004.06.007

Ajina, A., Lakhal, F., & Sougné, D. (2015). Institutional investors, information asymmetry and stock market liquidity in France. *International Journal of Managerial Finance, 11 (1)*, 44-59. https://doi.org/10.1108/IJMF-08-2013-0086

Ali, R., & Afzal, M. (2012). Impact of global financial crisis on stock market: Evidence from Pakistan and India. *Journal of Business Management and Economics, 3 (7)*, 275-282.

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets, 5 (1)*, 31-56.https://doi.org/10.1016/S1386-4181(01)00024-6

Amihud, Y., & Mendelson, H. (1986). Liquidity and stock returns. *Financial Analysts Journal, 42*(3), 43-48. https://doi.org/10.2469/faj.v42.n3.43

Anderson, M. (2017). A causal link between bond liquidity and stock returns. *Journal of Empirical Finance*, *44*, 190-208.https://doi.org/10.1016/j.jempfin.2017.09.002

Aslanidis, N., Osborn, D. R., & Sensier, M. (2002). Smooth transition regression models in UK stock returns. *University of Crete, Department of Economics, Working Paper*, (0201).

Barclay, M. J., Kandel , E., & Marx, L. M. (1998). The effects of transaction costs on stock prices and trading volume. *Journal of Financial Intermediation, 7*(2), 130-150. https://doi.org/10.1006/jfin.1998.0238

Bekaert, G., Harvey, C. R., & Lundblad, C. (2007). Liquidity and expected returns: Lessons from emerging markets. *The Review of Financial Studies, 20 (6)*, 1783-1831.https://doi.org/10.1093/rfs/hhm030

Bennett, J. A., Sias, R. W., & Starks, L. T. (2003). Greener pastures and the impact of dynamic institutional preferences. *Review of Financial Studies, 16*(4), 1203-1238. https://doi.org/10.1093/rfs/hhg040

Brennan, M., & Subrahmanyam, A. (1996). Market microstructure and asset pricing: On the compensation for illiquidity in stock returns. *Journal of Financial Economics, 41*(3), 441-464. https://doi.org/10.1016/0304-405X(95)00870-K

Cakici, N., & Zaremba, A. (2021). Liquidity and the cross-section of international stock returns. *Journal of Banking & Finance*, *127*, 106123. https://doi.org/10.1016/j.jbankfin.2021.106123

Carhart, M. M. (1997). On persistence mutual fund performance. *Journal of Finance, 52*(1), 57-82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x

Chan, H. W., & Faff, R. W. (2005). Asset pricing and the illiquidity premium. *Financial Review, 40*(4), 429-458. https://doi.org/10.1111/j.1540-6288.2005.00118.x

Chordia, T., Roll, R., & Subrahmanyam, A. (2000). Commonality in liquidity. *The Journal of Financial Economics, 56*(1), 3-28. https://doi.org/10.1016/S0304-405X(99)00057-4

Chordia, T., Roll, R., & Subrahmanyam, A. (2001). Market liquidity and trading Activity. *The Journal of Finance, 56 (2)*, 501-530. https://doi.org/10.1111/0022-1082.00335

Crombez, J., & Vennet, R. (1997). Risk-return relationship conditional on market movements on the Brussels Stock Exchange. *Department of Financial Economics, University of Ghent-Working Paper*, 1-23.

Dang, T. L., & Nguyen, T. M. H. (2020). Liquidity risk and stock performance during the financial crisis. *Research in International Business and Finance*, *52*, 101165. https://doi.org/10.1016/j.ribaf.2019.101165

Damodaran , A. (2005). Value and risk: Beyond betas. *Financial Analysts Journal, 61*(2), 38-43. https://doi.org/10.2469/faj.v61.n2.2714

Fabozzi , F. J., & Francis , J. C. (1977). Stability tests for alphas and betas over bull and bear market conditions. *The Journal of Finance, 32*(4), 1093-1099. https://doi.org/10.2307/2326515

Falkenstein, E. G. (1996). Preferences for stock characteristics as revealed by mutual fund portfolio holdings. *Journal of Finance, 51*(1), 111-135. https://doi.org/10.1111/j.1540-6261.1996.tb05204.x

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33 (1)*, 3-56.

Fernandez, F. A. (1999). Liquidity risk: New approaches to measurement and monitoring. *Securities Industry Association Working Paper*.

Gibson, R., & Mougeot, N. (2004). The pricing of systematic liquidity risk: Empirical evidence from the US stock market. *Journal of Banking and Finance, 28*(1), 157-178. https://doi.org/10.1016/S0378-4266(02)00402-8

Glosten, L., & Harris, L. (1988). Estimating the components of the bid-ask spread. *Journal of Financial Economics, 21*(1), 123-142. https://doi.org/10.1016/0304-405X(88)90034-7

Goyenko, R. Y., Holden, C. W., & Trzcinka, C. A. (2009). Do liquidity measures measure liquidity? *Journal of Financial Economics, 92*(2), 153-181. https://doi.org/10.1016/j.jfineco.2008.06.002

Gregory, A., Tharyan, R., & Christidis, A. (2013). Constructing and testing alternative versions of the Fama–French and Carhart models in the UK. *Journal of Business Finance & Accounting, 40 (1-2)*, 172-214. https://doi.org/10.1111/jbfa.12006

Hasbrouck, J. (1991). Measuring the information content of stock trades. *The Journal of Finance, 46*(1), 179-207. https://doi.org/10.1111/j.1540-6261.1991.tb03749.x

Haugen, R. A., & Baker, N. L. (1996). Commonality in the determinants of expected stock returns. *Journal of Financial Economics, 41*(3), 401-439. https://doi.org/10.1016/0304-405X(95)00868-F

Hauser, S., & Kedar-Levy, H. (2018). Liquidity might come at cost: The role of heterogeneous preferences. *Journal of Financial Markets, 39*(1), 1-23. https://doi.org/10.1016/j.finmar.2018.03.001

Huang, H. Y., & Ho, K. C. (2020). Liquidity, earnings management, and stock expected returns. *The North* American Journal of Economics and Finance, 54, 101261. https://doi.org/10.1016/j.najef.2020.101261

Huberman, G., & Halka, D. (2001). Systematic liquidity. *Journal of Financial Research, 24*(2), 161-178. https://doi.org/10.1111/j.1475-6803.2001.tb00763.x

Ince, B. (2020). Systematic vs. idiosyncratic liquidity: Cross-section of stock returns. Available at SSRN: https://ssrn.com/abstract=3644447

Karim, M., & Rashid, A. (2020). Equity liquidity, firm investment and financial performance: An assessment of the role of financial development. *Business Review*, *15*(2), 51-74. https://ir.iba.edu.pk/ businessreview/vol15/iss2/3

Lawrence, E. R., Karels, G. V., Mishra, S., & Prakash, A. J. (2006). the structural changes in the FF three-factor model and its robustness in the bear-bull market periods. *College of Business Administration, Florida International University-Working Paper*.

Lee, K. H. (2011). The world price of liquidity risk. *Journal of Financial Economics, 99*(1), 136-161. https://doi.org/10.1016/j.jfineco.2010.08.003

Leirvik, T., Fiskerstrand, S. R., & Fjellvikås, A. B. (2017). Market liquidity and stock returns in the Norwegian stock market. *Finance Research Letters*, *21*, 272-276. https://doi.org/10.1016/j.frl.2016.12.033

Li, H., Novy-Marx, R., & Velikov, M. (2019). Liquidity risk and asset pricing. *Critical Finance Review*, *8*(1-2), 223-255.

Liang, S. X., & Wei, J. K. (2012). Liquidity risk and stock returns around the world. *Journal of Banking & Finance, 36 (12)*, 3274–3288. https://doi.org/10.1016/j.jbankfin.2012.07.021

Liu, W. (2006). A Liquidity-augmented capital asset pricing model. *Journal of Financial Economics, 82*(3), 631-671.https://doi.org/10.1016/j.jfineco.2005.10.001

Liu, W. (2010). Liquidity risk and asset pricing: Evidence from daily data, 1926–2009. *Working Paper, University of Nottingham*.

Liu, W., Luo, D., & Huainan, Z. (2016). Transaction costs, liquidity risk, and the CCAPM. *Journal of Banking & Finance, 63*(1), 126-145. https://doi.org/10.1016/j.jbankfin.2015.11.011

Liu, G., Gregoriou, A., & Bo, Y. (2020). How do markets value stock liquidity? Comparative evidence from the UK, the US, Germany and China. *Economics Letters*, *186*, 108500. https://doi.org/10.1016/j.econlet.2019.06.006

Ma, R., Anderson, H. D., & Marshall, B. R. (2018). Market volatility, liquidity shocks, and stock returns: Worldwide evidence. *Pacific-Basin Finance Journal*, *49*, 164-199. https://doi.org/10.1016/j.pacfin.2018.04.008

Marozva, G. (2019). Liquidity and stock returns: New evidence from Johannesburg Stock Exchange. *The Journal of Developing Areas*, *53*(2), 79-90. https://doi.org/10.1353/jda.2019.0022

Miralles-Quirós, M. d., Miralles-Quirós, J. L., & Oliveira, C. (2017). The role of liquidity in asset pricing: The special case of the portuguese stock market. *Journal of Economics, Finance and Administrative Science, 22*(43), 191-206. https://doi.org/10.1108/JEFAS-12-2016-0001

Musneh, R., Karim, M. R. A., Geetha, C., & Arokiadasan, P. B. (2020). Liquidity risk impact on stock returns. *Malaysian Journal of Business and Economics (MJBE)*, 113-113.

Najaf, K., Najaf, R., & Yousaf, I. (2016). Attitude of Pakistan's individual investor towards risk during bull and bear markets. *Global Journal of Management and Business Research, 16*(5), 249-260.

Nguyen, N. H., & Lo, K. H. (2013). Asset returns and liquidity effects: Evidence from a developed but small market. *Pacific-Basin Finance Journal, 21*(1), 1175-1190. https://doi.org/10.1016/j.pacfin.2012.05.002

Nikolaou , K. (2009). Liquidity (risk) concepts: Definitions and interactions. *ECB Working Paper 1008*.

Pastor, L., & Stambaugh, R. F. (2003). Liquidity risk and expected stock returns. *Journal of Political Economy, 111 (3)*, 642-685.

Paul, T., Aryoubi, A., & Walther, T. (2021). The Time-varying Relationship between Liquidity and stock returns: Evidence from Germany. *Available at SSRN 3829227*.

Pereira, G. M. L., Camilo-da-Silva, E., & Barbedo, C. H. D. S. (2020). Trading imbalance, liquidity and stock returns: Evidence from Brazil. *Latin American Business Review*, *21*(2), 173-195. https://doi.org/10.1080/10978526.2019.1701482

Peterson , J., & Berglund, D. (2007). Evaluation of fund manager performance: An empirical study of Sweden funds between 2001 and 2005. *Master thesis-Stockholm School of Economics*.

Qayyum, A., & Khan, M. (2014). Dynamic relationship and volatility spillover between the stock market and the foreign exchange market in Pakistan: Evidence from VAR-EGARCH modelling. *Pakistan Institute of Development Economics, Working Paper, 103*.

Theriou, N. G., Aggelidis, V. P., Maditinos, D. I., & Šević, Ž. (2010). Testing the relation between beta and returns in the Athens Stock Exchange. *Managerial Finance, 36*(12), 1043-1056. https://doi.org/10.1108/03074351011088441

Yasir, M., Aamir, S., & Ahmad, K. (2014). Attitude of Pakistan's individual investor towards risk during bull and bear markets. *VFAST Transactions on Education and Social Sciences, 5*(2), 16-28.